

REMARKS

Claims 1-24 are all the claims pending in the application. The Examiner objects to the Drawings for the inclusion of reference symbols that have been used to designate more than a single element. Further, the Examiner rejects claims 1-3, 6-9,11,14-15 and 21-22 under 35 U.S.C. §102(b) as being anticipated by Drees (US 5,932,953). In addition, the Examiner rejects claims 10 and 16-18 as being unpatentable over Drees in view of Ueyangi (US Application Publication 2002/0017138 A1), and claims 12 and 23 as being unpatentable over Drees in view of Wohltjen (US 4,312,228). The Examiner objects to claims 4-5, 13, 19-20, and 24 as being dependent upon a reject base claim, but indicates these claims would be allowable if rewritten in independent form.

Applicant appreciates the allowability of claims 4-5, 13, 19-20, and 24.

Drawing Objections

Applicant amends the specification to claim priority under 35 U.S.C. § 119(a) to Korean Application No. 04879/2003 filed January 24, 2003.

Applicant has amended the specification to correct the reference designator for the sensor chip from 10 to 100 on page 9, line 4. Also, Applicant has amended the paragraph beginning on page 11, line 9 to correct a typographical error. Applicant believes these amendments overcome the Examiner's objections, and respectfully request reconsideration and withdrawal of the objections.

§ 102(b) Rejection

Claims 1-3, 6-9,11,14-15 and 21-22 have been rejected under 35 U.S.C. 102(b) as being anticipated by Drees (US 5,932,953).

A proper rejection for anticipation under § 102 requires complete identity of invention. The claimed invention, including each element thereof as recited in the claims, must be disclosed or embodied, either expressly or inherently, in a single reference. Scripps Clinic & Research Found. v. Genentech Inc., 927 F.2d 1565, 1576, 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991);

Standard Havens Prods., Inc. v. Gencor Indus., Inc., 953 F.2d 1360, 1369, 21 U.S.P.Q.2d 1321, 1328 (Fed. Cir. 1991). Applicant respectfully traverses these rejections.

Independent claims 1 and 14:

Drees is directed to a method and system for detecting material using piezoelectric resonators and teaches a two-port reference and sensing resonator combination as shown in FIG. 5B. The two resonators are supported on a thin SiO₂ layer, which is thermally grown on a silicon substrate. The portions of the Si substrate under the resonators are etched away to allow the resonators to undergo resonant movement. The bottom of the Si substrate has a layer of silver paint 80 applied thereto serving as a grounding plane.

Each resonator has an epitaxially deposited AlN or ZnO piezoelectric layer providing a shear mode resonance frequency of 900 MHz. The piezoelectric layer is in the shape of a square. A rectangular input electrode and a rectangular output electrode are formed on opposite sides of the piezoelectric layer. *See*, Drees, col. 7, line 45 to col. 8, line 9. Therefore, each of the two resonators consists of a piezoelectric layer sandwiched between an input and an output electrode and supported on a thin SiO₂ layer, and wherein a supporting substrate has been etched away to expose the thin SiO₂ supporting layer.

The application is also directed to a material sensing sensor and module using thin film bulk acoustic resonator and teaching a two-port reference and sensing combination. Referring to FIG. 2 in the application, each acoustic resonator has piezoelectric material sandwiched between a common and an upper electrode and supported by a lower membrane, and wherein a substrate has been etched away to expose the lower membrane. However, the application also teaches and claims a **reactive layer** (identified as element 7 in each of FIGS. 2, 4, 5, and 6) **deposited within the sensing resonator cavity, and not within the reference resonator cavity**. The material for the reactive layer may be selected depending on the types of the target material. *See*, application, p. 12, lines 8-15. This reactive layer is not taught or suggested by Drees.

Applicant amends claims 1 and 14 to more clearly describe the invention by adding the element of a reactive layer to the measuring resonator. Dependent claims 4-7 and 19-22 have also been amended to reflect the changes to their respective independent claims.

Applicant respectfully submits that because Drees does not teach each and every element of the now amended independent claims 1 and 14, Drees does not anticipate the invention of claims 1 and 14. Thus, for at least the reasons discussed above, claims 1 and 14 are allowable. Claims 2-13 and 14-24 depend from claims 1 and 14 and therefore are also allowable.

Dependent claims 2-3, 6-9, 11, 13-15, and 21-22:

Each of the above listed dependent claims depends from an allowable independent claim and is therefore allowable. Applicant respectfully request reconsideration and withdrawal of the rejection.

§ 103(a) Rejection

Claims 10 and 16-18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Drees in view of Ueyanagi, and claims 12 and 23 as being unpatentable over Drees in view of Wohltjen. To establish a *prima facie* case of obviousness under 103(a), three basic criteria must be met one of which is that the prior art reference (or references when combined) must teach or suggest all the claim limitations. *See*, MPEP 2143.

Claims 10 and 16-18

Ueyanagi is directed to an acceleration sensor chip comprising a support frame part, and a sensor structure including at least one displaceable weight part, and a beam part for connecting the weight part to the support part, the support frame part and the sensor structure being formed on a silicon substrate through an insulation layer, wherein the insulation layer between the sensor structure and the silicon substrate is removed, the beam part comprising a plurality of sets of beams which are parallel to each other, the weight part is connected to the support frame part by the plurality of sets of parallel beams, and at least two semiconductor strain gauges are formed on the surface of at least one set of the plurality of sets of parallel beams. However, Ueyanagi is silent on providing a reactive layer in a piezoelectric resonator.

Claims 10 and 16-18 are dependent from independent claims 1 and 14, each of the independent claims requiring a reactive layer. Dependent claims 10 and 16-18 are related to

limitations of chip and sensor fabrication of the piezoelectric resonators having a reactive layer of claims 1 and 14. When taken together, the combination of Drees and Ueyanagi fail to teach or suggest a piezoelectric resonator having a reactive layer.

Because, neither Drees nor Ueyanagi, nor the combination thereof teaches all the limitations of claims 10 and 16-18, the prima facie case of obviousness fails, and claims 10 and 16-18 are allowable. Applicant respectfully requests reconsideration and withdrawal of the rejection.

Claims 12 and 23

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP 2143.

Claims 12 and 23 are dependent from independent claims 1 and 14, each of the independent claims requiring a reactive layer. Claims 12 and 23 relate to a signal processor having a sensing oscillator, a reference oscillator, an RF signal mixer, and a power measuring unit. The Examiner relies upon Drees for disclosing the oscillators and the power measuring unit, and upon Wohltjen for disclosing the RF mixer.

Wohltjen is directed to a method for detecting a substance, which comprises generating a surface acoustic wave in a piezoelectric material element coated on the surface through which the wave travels with a material selectively interactive with said substance; contacting said substance with the coating material thereby altering at least one property of the surface acoustic wave; and measuring the alteration of a wave property as an indication of the presence of the substance.

As discussed above, Drees teaches a sensor having a sensing resonator and a reference resonator, each without a reactive layer, but wherein resonator has piezoelectric material upon

which two electrodes are formed. Wohltjen discloses a single sensor for detecting or sensing a substance, wherein the sensor comprises a piezoelectric material having a coating that selectively interacts with the substance. It is not possible to combine Wohltjen and to have Wohltjen's coating be applied to Drees's piezoelectric material because Drees's piezoelectric material has electrodes formed on each of the two surfaces. *See, e.g.,* Drees, elements 82, 86, and 88 of FIG. 5B. Because Wohltjen's coating cannot be applied to Drees's piezoelectric material, there is no motivation to combine Drees and Wohltjen within either Drees or Wohltjen, and the *prima facie* case for obviousness must fail.

Further, even if Drees and Wohltjen could be combined, the combination would teach that each of Drees's two resonators would have Wohltjen's coating. This teaching is contrary to independent claims 1 and 14, which require a reactive coating be applied to only the sensing resonator. Therefore, the combination of Drees and Wohltjen do not teach all the limitations of the independent claims. For this additional reason, the *prima facie* case for obviousness must fail.


Because the *prima facie* case for obviousness has not been made, Applicant respectfully requests reconsideration and withdrawal of the rejection.

CONCLUSION

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,
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Date: November 18, 2005

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